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10/769,549

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Thomas M. Weeks

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EXAMINER

DHINGRA, RAKESH KUMAR

ART UNIT

PAPER NUMBER

1763

DATE MAILED: 05/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/769,549

Applicant(s)

WEEKS ET AL.

Examiner

Rakesh K. Dhingra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 2/6/06.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-65 is/are pending in the application.
- 4a) Of the above claim(s) 2,3,5-8,15,22,23,27,32-37 and 41-65 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,9-14,16-21,24-26,28-31 and 38-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 04/04/04 05/04/04
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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Election/Restrictions

Applicant's election without traverse of invention of group I (apparatus) and species 1 (Figures 2a-2d) with claims 1, 4, 6, 9-21, 24-26, 28-31 and 38-40 reading on the elected species, in the reply filed on 2/2/06 is acknowledged. It is however noted that claim 6 pertains to non-elected species (species 2), and is therefore also withdrawn from consideration. Further claim 15 is also withdrawn from consideration since it has limitation "opening" that links it to claim 8, which in turn pertains to species 4 (non-elected species).

Thus claims 2, 3, 5-8, 15, 22, 23, 27, 32-37, 41-65 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1, 4, 9, 10 are rejected under 35 U.S.C. 102(a) as being anticipated by Chondroudis et al (US PG PUB No. 2003/0224105).

Regarding Claims 1, 4, 9: Chondroudis et al teach an apparatus (Figures 11-19) that comprises a support assembly for supporting a substrate holder 251 during substrate processing, comprising a substrate holder support (includes holder 251, connector 291) configured to prevent rotational slippage of the substrate holder support relative to a rotational drive (includes drive shaft 271, rotor 269, output shaft 265) with the help of

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keys (retaining member) 293. Further the keys 293 could be permanently installed in slots 295 (paragraphs 0092-0096).

Regarding Claim 10: Chondroudis et al teach (Figure 19) the drive shaft (rotational drive) 271 is an elongated shaft having a longitudinal axis and an outer surface, the shaft having slots (indentation) 295 in the outer surface, the indentation being configured to be engaged by the keys (retaining member) 293 (paragraph 0096).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 11, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chondroudis et al (US PG PUB No. 2003/0224105).

Regarding Claims 11, 12: Chondroudis et al teach all limitations of the claim including two slots (indentations) 295 that receive two keys (retaining member) 293 (Figure 19)

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equally spaced about the shaft (drive shaft) 271 perimeter. Chondroudis et al do not teach three indentations.

In this regard courts have ruled (Case Law):

“Duplication of parts was held to have been obvious. *St. Regis Paper Co. v. Beemis Co. Inc.* 193 USPQ 8, 11 (1977); *In re Harza* 124 USPQ 378 (CCPA 1960).”

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chondroudis et al (US PG PUB No. 2003/0224105) in view of Keeton et al (US PG PUB No. 2003/0205324).

Regarding Claim 13: Chondroudis et al teach all limitations of the claim including that slots (indentations) 295 are located on the upper end of drive shaft 271.

Chondroudis et al do not teach one end of shaft with a tapered surface.

Keeton et al teach an apparatus (Figure 1) that includes a substrate support with a drive shaft 24 whose upper end is tapered to fit within a recess of a multi-armed spider assembly 22 (paragraphs 0030).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use drive shaft with taper as taught by Keeton et al in the apparatus of Chondroudis et al to provide proper mating between shaft and spider hub.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chondroudis et al (US PG PUB No. 2003/0224105) in view of Jang et al (US PG PUB No. 2003/0034741).

Regarding Claim 14: Chondroudis et al teach all limitations of the claim including that shaft has three indentations.

Chondroudis et al do not teach indentation is only one indentation.

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Jang et al teach an apparatus (Figures 5, 6A, 6B, 7, 8) that includes a drive shaft 110 with one keyway (indentation) 112 that rotates a rotating arm 120 having a key 122 and thus control the tilt of a wafer installed on wafer platen 75 (paragraphs 0060-0063).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use one indentation in drive shaft as taught by Jang et al in the apparatus of Chondroudis et al to increase reliability of the process (paragraph 0028).

Claims 16, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chondroudis et al (US PG PUB No. 2003/0224105) in view of Oda (JP Pub No. 02-309008).

Regarding Claims 16, 17: Chondroudis et al teach all limitations of the claim except retaining member comprising of ceramic material.

Oda teaches an apparatus that includes a ceramic key for connecting two mechanical parts and transferring torsional (rotational) moment (abstract). Further quartz is also ceramic based material.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use retaining member (key) comprising of ceramic as taught by Oda due to advantageous properties of ceramic key like abrasion resistance, heat resistance, rigidity and assuring continuous usage due to improved mechanical stability.

Claims 18, 20, 28, 30,31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chondroudis et al (US PG PUB No. 2003/0224105) in view of Aggarwal et al (US PG PUB No. 2003/0173031).

Regarding Claims 18, 20: Chondroudis et al teach all limitations of the claim including

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the rotational drive comprises a drive shaft 271 having at least one slot (indentation) 295 and the substrate holder support comprises a hub (socket) 289 configured to receive a portion of the shaft and the support being configured so that insertion of the retaining member engages the retaining member with the at least one indentation in the shaft to prevent rotation of the substrate holder support with respect to the shaft. Chondroudis et al do not teach the support having an opening located in a sidewall of the socket.

Aggarwal et al teach an apparatus (Figures 7-12) that includes a drive 68 that rotates a substrate support which includes lift ring 90 and inner plug 91 (socket) and where the inner plug has recess (opening) 98 that is shaped and sized to receive anti-rotation key 106 (paragraphs 0072-0076).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the socket with a socket having opening as taught by Aggarwal et al in the substrate support of Chondroudis et al prevent rotation between shaft and support.

Regarding Claims 28, 30: Aggarwal et al teach that apparatus (Figures 1, 2-4, 7) is configured to support a wafer support structure (substrate holder) 18 for holding a semiconductor wafer 16 and where the substrate holder comprises susceptor 53 (paragraph 0049).

Regarding Claim 31: Aggarwal et al teach that the substrate holder support includes a plurality of arms 19 extending generally radially outward and upward from the socket the arms configured to support susceptor (substrate holder) 53 (paragraph 0049).

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Claims 19, 25, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chondroudis et al (US PG PUB No. 2003/0224105) in view of Aggarwal et al (US PG PUB No. 2003/0173031) as applied to claim 18 and further in view of White et al (US Patent No. 5,562,947).

Regarding Claim 19: Chondroudis et al in view of Aggarwal et al teach all limitations of the claim except that the opening and the at least one indentation when aligned together form a passage configured to receive the retaining member.

White et al teach an apparatus (Figure 4) that includes a susceptor body 100 with a flange 110 that is coupled (through a hole - opening) to drive shaft 50 whose top surface 112 has a hole (indentation) to receive a screw (retaining member) 113 (column 8, line 55 to column 9, line 8).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use an opening in susceptor aligned with an indentation in shaft as taught by White et al in the apparatus of Chondroudis et al in view of Aggarwal et al to provide slip-free linkage between susceptor and the shaft.

Regarding Claims 25, 26: White et al teach (Figure 4) the hole for screw (opening in susceptor flange 110) is substantially cylindrical and the screw (retaining member) 113 includes a substantially cylindrical end portion configured to be removably and slidably inserted into the opening and wherein the end portion of the screw (retaining member) 113 is configured to substantially fill the hole (opening) [column 8, line 55 to column 9, line 8].

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chondroudis et al (US PG PUB No. 2003/0224105) in view of Aggarwal et al (US

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PGPUB No. 2003/0173031) as applied to claim 18 and further in view of Green (US Patent No. 5,472,510) and Marc et al (US Patent No. 6,293,595).

Regarding Claim 21: Chondroudis et al in view of Aggarwal et al teach all limitations of the claim except lock for selectively securing the retaining member in slot.

Green teach an apparatus (Figures 7A-7C) that includes radial substrate supports 40, 40a coupled with rotary shafts 34, 34a and where rotary shafts 34, 34a are vertically translatable in sleeves 37, 37a to enable remove the substrate magazine 33 free from the shafts (rotational drive) 34, 34a. Green also teach that movement of shafts 34, 34a can be selectively locked using screws 36 (column 16, lines 10-45).

Further, Marc et al teach anti-rotation locking unit for a support member where one of mutually rotatable elements can be selectively locked by a locking member (column 2, lines 35-65).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use support assembly having selective locking as taught by Green and Marc et al in the apparatus of Chondroudis et al to obtain mechanical and selective locking between two locking parts.

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chondroudis et al (US PGPUB No. 2003/0224105) in view of Aggarwal et al (US PGPUB No. 2003/0173031) as applied to claim 18 and further in view of Travis (US Patent No. 6,486,550).

Regarding Claim 24: Chondroudis et al in view of Aggarwal et al teach all limitations of the claim except retaining member with one end oriented generally transverse to

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second end (like a right angle shape) and retaining member being movable between first and second positions as part of its function.

Travis teaches an apparatus (Figure 2) that includes wafer carriers 28 for holding wafer 16 that are removed/delivered to conveyor 26 and a locking mechanism 40 (includes locking element 46) that has a first position (unlocked state) and a second position (locked state) [column 3, line 60 to column 4, line 60]. Travis further teaches that locking member 46 can be selected to be of any suitable shape (include right angled shape) as per other adjacent/mating parts (column 6, lines 55-65). Claim also recites limitations pertaining to intended use of the apparatus, which the apparatus as per references would be capable of performing.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a locking mechanism with two position operation (lock and unlock) as taught by Travis in the apparatus of Chondroudis et al to obtain detachable coupling between shaft and substrate support (column 2, lines 1-5).

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chondroudis et al (US PG PUB No. 2003/0224105) in view of Aggarwal et al (US PG PUB No. 2003/0173031) as applied to claim 18 and further in view of Keeton et al (US Patent No. 6,486,550).

Regarding Claim 29: Chondroudis et al in view of Aggarwal et al teach all limitations of the claim except substrate holder is configured for 300 mm wafer.

Keeton et al teach an apparatus (Figure 1) that includes a substrate support with a drive shaft 24 whose upper end is tapered to fit within a recess of a multi-armed spider

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assembly 22 (paragraphs 0030). Keeton et al also teach that apparatus is configured for 300 mm wafers also.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use substrate support for 300 mm wafers as taught by Keeton et al in the apparatus of Chondroudis et al in view of Aggarwal et al to enable achieve higher volume of parts on the same apparatus.

Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chondroudis et al (US PG PUB No. 2003/0224105) in view of Green (US Patent No. 5,472,510).

Regarding Claim 38: Chondroudis et al teach all limitations of the claim except allowing substrate holder to be lifted free of rotational drive (allowing vertical movement).

Green teach an apparatus (Figures 7A-7C) that includes radial substrate supports 40, 40a coupled with rotary shafts 34, 34a and where rotary shafts 34, 34a are vertically translatable in sleeves 37, 37a (lifted free) to enable remove the substrate magazine 33 free from the shafts (rotational drive) 34, 34a (column 16, lines 10-45).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use support assembly with drive shaft configuration as taught by Green in the apparatus of Chondroudis et al to enable freely lift the substrate holder from the shaft (column 16, lines 15-25).

Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chondroudis et al (US PG PUB No. 2003/0224105) in view of Aggarwal et al (US PG PUB No. 2003/0173031), White et al (US Patent No. 5,562,947) and Travis (US Patent No. 6,486,550).

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Regarding Claim 39: Chondroudís et al in view of Aggarwal et al and White et al teach all limitations of the claim (as explained above) including that substrate processing system comprises a support member having a receptor and a plurality of arms extending generally radially outward from the receptor, the arms being configured to support an underside of a holder, the receptor having an hole in a sidewall of the receptor (Aggarwal et al - paragraphs 0072-0076), a locking key, and a rotational linkage having an end portion configured to be received within the receptor such that the rotational linkage is rotatable with respect to the receptor about a longitudinal axis of the rotational linkage, the end portion having at least one retaining surface, the at least one retaining surface and the hole configured so that when the rotational linkage is rotated to a locking position, the at least one retaining surface and the hole together form a passage sized and configured to receive the locking key in a manner such that the locking key prevents the support member from rotating independently of the rotational linkage (White et al - column 8, line 55 to column 9, line 8).

Chondroudís et al in view of Aggarwal et al and White et al do not teach rotational linkage being partially rotatable with respect to receptor.

Travis teach an apparatus (Figure 2) that includes wafer carriers 28 for holding wafer 16 that are removed/delivered to conveyor 26 and a locking mechanism 40 that enables a locked state and an unlocked state (would enable partial rotation of rotational linkage with respect to receptor) [column 3, line 60 to column 4, line 60].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a locking mechanism with two position operation as taught by Travis in

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the apparatus of Chondroudis et al to obtain detachable coupling (partial rotation) between shaft and substrate support (column 2, lines 1-5).

Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chondroudis et al (US PG PUB No. 2003/0224105) in view of Aggarwal et al (US PG PUB No. 2003/0173031), White et al (US Patent No. 5,562,947) and Travis (US Patent No. 6,486,550) as applied to claim 39 and further in view of Green (US Patent No. 5,472,510).

Regarding Claim 40: Chondroudis et al in view of Aggarwal et al, White et al and Travis teach all limitations of the claim except no locking for vertically applied forces.

Green teach an apparatus (Figures 7A-7C) that includes radial substrate supports 40, 40a coupled with rotary shafts 34, 34a and where rotary shafts 34, 34a can be translated (unlocked) in vertical direction by removing screws 36 (column 16, lines 10-45).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use support assembly with drive shaft configuration as taught as taught by Green in the apparatus of Chondroudis et al in view of Aggarwal et al, White et al and Travis to enable obtain unlocking in vertical direction (column 16, lines 15-25).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone

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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rakesh Dhingra



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